

Multi-Piece Nestable Equipment Base

Background of the Invention

The present invention relates generally to a base for equipment, and in particular to a
5 lightweight, pre-formed base for equipment.

It is well known in the art that industrial equipment such as air conditioning condensers, heating units, and electrical transformers should be elevated above the ground in order to protect the equipment from damage caused by vibration or contaminants, e.g., dirt, debris, and moisture. Historically, such equipment was mounted on bases constructed from
10 concrete. Concrete equipment bases proved unsatisfactory because pouring and smoothing the concrete bases at the construction site was very time-consuming and costly, and pre-cast concrete bases were generally too heavy to manipulate or ship economically.

The dissatisfaction with concrete equipment bases gave rise to the use of pre-cast equipment bases made from composite materials. For instance, U.S. Pat. No. 4,505,449
15 suggests a composite pad having a polystyrene foam core covered on five sides with a fiberglass and cement composition. Such a composite pad is preferred over a concrete base because it maintains the preferred monolithic appearance of a concrete base, but weighs less than a concrete base and is capable of supporting the same or greater loads than a concrete base. Additionally, pre-cast composite bases, because of their lighter weight, can be installed
20 without heavy equipment and transported with greater ease.

Recent improvements in the art have been aimed at manipulating either the material used for the core of the equipment base or the material used for the outer pad of the base. For example, U.S. Pat. No. 6,050,539 proposes the use of a moldable lightweight plastic material for the core component, rather than polystyrene foam, but continues to surround the core with
25 a concrete shell. Alternatively, U.S. Pat. No. 4,869,456 suggests retaining the cellular foam

core, but constructing the pad out of molded plastic and interspersing the interior of the pad with plastic strengthening ribs. Although both these methods serve to produce a lightweight equipment base, their relative bulk makes them costly to ship. These products typically consume the cube of a shipping vessel (truck or container) well before they reach the weight
5 limit of that shipping vessel.

To alleviate the costs of transportation, equipment bases capable of being stacked one upon another have been used, thereby minimizing the volume needed for shipping. U.S. Pat. No. 5,895,025, in particular, discloses an equipment base that may be stacked in pairs – the irregular bottom surface of one base nesting within the irregular bottom surface of a second
10 base.

Another problem with conventional molded plastic equipment bases is that the outer shell of the pad and the support ribs are molded out of the same material, despite the fact that the properties desirable for the outer shell are not often the same as those required for the support ribs. The outer shell, including the top surface and four sides of the equipment base,
15 is subject to and must be resistant to ultraviolet (UV) radiation, moisture, organisms, impacts, and many common chemicals. The support ribs are free from such exposure, but must be of adequate strength and stiffness to support the heavy loads applied to the top surface of the base.

A need therefore exists for an improved pre-formed equipment base that has the
20 necessary strength to support heavy loads, yet is lightweight, inexpensive to manufacture, aesthetically appealing, easy to transport, simple to install, and takes into account the difference in desired properties between the outer shell and support ribbing.

Summary of the Invention

The present invention answers this need by providing a multi-piece lightweight pre-formed equipment base wherein each piece, i.e., the outer shell of the pad and the support ribbing, may be constructed from materials having the desired properties for that piece's function, and wherein each piece is capable of nesting with like pieces so that shipping limits on weight and volume are reached simultaneously.

Generally described, the present invention relates to a base for equipment, including a pad having a top surface, a plurality of side surfaces, and a hollow core. At least one insert support ribbing mates with the hollow core to construct the base. Furthermore, the hollow core of the pad is adapted to receive the top surface of a similarly-formed second pad such that multiple pads may be stacked one upon another to minimize shipping volume. Likewise, the at least one insert support ribbing is adapted to receive a similarly-formed second at least one insert support ribbing such that multiple support ribbings may be stacked one upon another to minimize shipping volume.

It is thus an object of the present invention to provide an equipment base that allows the outer shell of the pad and the support ribbing to each be constructed out of materials selected for their performance attributes, i.e., materials having the desired properties for the function of that particular part of the equipment base.

It is a further object of the present invention to provide an equipment base that may be condensed for shipment, thereby reducing transportation costs.

In an embodiment of the present invention, the outer shell of the pad is molded in one piece, having a top surface, four sides, and a hollow core, constructed out of plastic or a composite material. In such embodiments, it is an object to provide an aesthetically desirable monolithic-looking equipment base. Because the outer shell of the pad is molded separately from the ribbing, it is another object to provide a base that is inexpensive to manufacture.

In an embodiment of the present invention, the second core piece of the base, the support ribbing, is constructed from a plastic material or other conventional materials. The support ribbing mates with the hollow core of the pad via a snap fit, adhesives, fasteners, or other conventional means. In such embodiments, it is an object to provide an equipment base that may be easily assembled as close to the end use point as possible. Because the support ribbing is separately molded, it is a further object to provide an equipment base that maximizes ground contact and strength, while minimizing material.

Other objects, features, and advantages of the present invention will become apparent upon inspection of the following detailed description of the preferred embodiment of the invention, taken in conjunction with the drawings and appended claims.

Brief Description of the Drawings

FIG. 1 is a top perspective view showing the joinder of the pad and the insert support ribbing in an embodiment of the present invention.

FIG. 2 is a bottom perspective view showing the insert support ribbing mated with the hollow core in an embodiment of the present invention.

FIG. 3 is a side view of multiple pads nested for compact shipment in an embodiment of the present invention.

FIG. 4 is a side view of multiple insert support ribbings nested for compact shipment in an embodiment of the present invention.

Detailed Description of the Invention

Referring to FIGS. 1 and 2, the present invention provides a multi-piece lightweight pre-formed equipment base 10. The equipment base 10 includes a pad 20 and an insert support ribbing 30. The pad 20 has a top surface 22, a bottom surface 24, and four downwardly extending side surfaces 26, creating a hollow core 28. The periphery of the pad 20 forms an edge 25 to provide structural support for the pad 20. The pad 20 is a unitary

structure, preferably constructed from molded or thermoformed plastic such as polypropylene, polyethylene, acrylonitrile butadiene styrene (ABS), polystyrene, polyvinyl chloride (PVC), or high impact polystyrene (HIPS) using an A-B injection mold tool. In alternative embodiments steel, aluminum, wood, metals and other non-plastic materials and 5 plastic/non-plastic composites may also be injection molded. Those of ordinary skill in the art will appreciate that the invention encompasses virtually any material and composites capable of injection molding depending on the desired characteristics of the formed article.

A typical pad **20** manufactured according to this embodiment is square in shape, two (2) to three (3) inches in height, and available in various sizes, including, in exemplary 10 embodiments, 24x24 inches and 60x60 inches. In other embodiments the pad may be rectangular, such as one embodiment provided for a 48x96 inches pad. It will be appreciated that all dimensions will vary according to the end-use and desired characteristics of the pad.

The top surface **22** and the side surfaces **26** of the pad **20** are generally continuous with no recesses or holes therein because of building codes requirements and aesthetic 15 preferences of contractors and owners. To permit nesting, the side surfaces **26** will not be normal to the top surface **22**, but rather will differ from ninety-degrees by the draft angles present in the utilized molds. A pad **20** constructed according to these dimensions and constructed out of either polypropylene or polyethylene can support approximately 300 to 1000 pounds of load on typical soil.

20 The insert support ribbing **30** includes a top surface **32**, a bottom surface **34**, and a plurality of upwardly extending ribs **36**, creating a hollow core **37**. The insert support ribbing **30** is a unitary structure, preferably constructed using an A-B injection mold tool. The support ribbing may also be formed of virtually any materials and composites as the pad **20**. However, unlike the pad **20**, the material of the support ribbing **30** does not typically have

any aesthetic requirements, so less expensive materials that provide sufficient sturdiness for support functions can be used.

FIGS. 1 and 2 depict an exemplary arrangement of features **40** forming such ribs **36**, designed principally to maximize ground contact and strength while minimizing material.
5 Such an arrangement also acts to inhibit lateral and rotational movement of the equipment base **10** relative to the ground. In the embodiment of the invention shown, the insert support ribbing **30** includes five (5) octangular features **40** arranged in a star-like pattern, having a central feature **42** and four peripheral features **44** radiating from the central feature **42** toward the corners of the insert support ribbing **30**, and connected to the central feature **42** by rectangular support ribs **46**. Four (4) additional linear support ribs **46** radiate from the central feature **42** at ninety-degree angles toward the sides of the insert support ribbing **30**.
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In one embodiment, the bottom surface **34** of the features **40** contains a series of rectangular and circular holes **38**. In such an embodiment, the holes **38** tend to collect soil, thereby locking the equipment base **10** into position and preventing lateral and rotational movement of the base **10** after equipment has been mounted. In addition, constructing the bottom surface **34** of the features **40** with such holes **38** minimizes the material necessary for manufacture of the insert support ribbing **30**, thus reducing the overall weight and manufacturing costs of the equipment base **10**.
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The joinder of the insert support ribbing **30** with the pad **20** is shown in FIG. 1. The insert support ribbing **30** is sized to snap fit into the edge **25** of the pad **20** and fill the hollow core **28**. FIG. 2 shows the insert support ribbing **30** mated with the pad **20**.

Although embodiments of the equipment base **10** consistent with FIGS. 1 and 2 are particularly useful in maximizing ground contact and strength while minimizing material, and tend to inhibit lateral and rotational movement of the equipment base **10**, other arrangements may be adequate to achieve the desired results. For example, while the features **40** of the
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insert support ribbing 30 are shown to be octangular and arranged in a star-like pattern, they need not be so shaped or arranged. Similarly, although the insert support ribbing 30 described is a unitary structure, other embodiments of the present invention consist of more than one insert support ribbing 30. Also, other methods of joinder for the pad 20 and the 5 insert support ribbing 30 may be used, including adhesives, mechanical fasteners, welding, Emabond, stapling, hot staking or other conventional means. Finally, there is no requirement that the equipment pad 20 be square. Any conventional shape may be employed, including, but not limited to, round, octagonal, rectangular, and the like.

As shown in FIG. 3, multiple pads 20 may be stacked one upon another by nesting the 10 top surface 22 of one pad 20 within the hollow core 28 of a second, similarly formed pad 20'. The top surface 22 of the first pad 20 thus becomes near to flush with the bottom surface 24 of the second pad 20', thereby reducing shipping volume.

Likewise, FIG. 4 shows that multiple insert support ribbings 30 may be stacked one upon another by nesting the bottom surface 34 of one insert support ribbing 30 within the 15 hollow core 37 of a second, similarly formed insert support ribbing 30'. The bottom surface 34 of the first insert support ribbing 30 thus becomes near to flush with the top surface 32 of the second insert support ribbing 30', thereby reducing shipping volume.

Similarly, the pads 20 and the insert support ribbings 30 may be stacked while awaiting use. In use, the respective components of the equipment base 10, the pad 20 and the 20 insert support ribbing 30, can be shipped separately. The insert support ribbing 30 can be joined with the pad 20 as close to the end use point as preferred to assemble the equipment base 10. Installation of the equipment base 10 at the construction site or other location requires little site preparation beyond having an essentially flat region. The equipment may then be secured to the base 10. After use, the insert support ribbing 30 can be disjoined from 25 the pad 20 and both can be reused.

Although this invention has been described in specific detail with reference to the disclosed embodiments, it will be understood that many variations and modifications may be affected within the spirit and scope of the invention as described in the following claims.